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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/729,716	12/05/2003	Vijay Varadan	2002-2730	2678

30330 7590 07/11/2006

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EXAMINER	
RAETZSCH, ALVIN T	
ART UNIT	**PAPER NUMBER**
1754	

DATE MAILED: 07/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/729,716	VARADAN ET AL.	
	Examiner	Art Unit	
	Alvin T. Raetzsch	1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-73* is/are pending in the application.

4a) Of the above claim(s) *21-45* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20 and 46-73* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-73* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 May 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/5/04;8/18/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-20 & 46-73, drawn to a carbon nanotube product, classified in class 423, subclass 447.2.

   II. Claims 21-45, drawn to a method of making carbon nanotubes, classified in class 423, subclass 447.3.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case coiled nanotubes can be produced by thermal chemical vapor deposition, as opposed to a microwave field deposition.

Because these inventions are independent or distinct for the reasons given above and the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

2. During a telephone conversation with Livinia Jones on 6/29/06 a provisional election was made without traverse to prosecute the invention of a carbon nanotube product, claim1-20 & 46-73. Affirmation of this election must be made by applicant in replying to this Office action. Claims 21-45 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

4. Note: In the specification (top of page 5) it is stated that previous experiments by Varadan in the 2002 article "did not involve the production of carbon nanocoils". The background of the specification (bottom of page 1) states that Varadan produced carbon nanocoils while citing the same article. This article, submitted by the applicant, does in fact teach the production of carbon nanocoils. The statement that nanocoils were not produced in these experiments requires correction or deletion.

Claim Rejections

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1-21 & 46-73** are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Biro et al. (Oct 2002).

Biro teaches coiled carbon nanotubes with substantially uniform diameter and distance between coils throughout its length. A ratio of 1:1 is taught (page 5, last paragraph of discussion) and it is taught that a ratio of 0.1:1 is known in the art (page 1, 2nd column). While Biro does not mention the diameter or the distance between coils,

nanotube to one of skill in the art means diameters less than 100nm. The distance between coils would be expected with the non-hex to hex ratios taught.

Claims 46-73: Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself and does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process, *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966. The burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product, *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (MPEP § 2113).

6. **Claims 13-20 & 46-73** are rejected under 35 U.S.C. 102(b) as being anticipated by Volodin et al. (2000).

Volodin teaches coiled carbon nanotubes with substantially uniform diameter and distance between coils throughout its length (Fig. 2), diameters of less than 100nm, and distance between coils of less than 200nm (Table 1). See above with regard to product-by-process claims 46-73.

7. **Claims 13-20 & 46-73** are rejected under 35 U.S.C. 102(b) as being anticipated by Amelinckx et al. (1994).

Amelinckx teaches coiled carbon nanotubes with substantially uniform diameter and distance between coils throughout its length (Fig. 1), diameters of less than 100nm, and distance between coils of less than 200nm (Fig. 1). See above with regard to product-by-process claims 46-73.

8. **Claims 1-12** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Amelinckx et al. (1994).

Amelinckx teaches coiled carbon nanotubes with substantially uniform diameter and distance between coils throughout its length, but does not teach the non-hexagonal to hexagonal ratio of the coils. From the variety of coils produced as shown in Fig. 1, it

is expected that many of the possible ratios of nanocoils are produced by Amelinckx, including those of the presently claimed invention, since the ratio determines the tightness of the coils.

9. **Claims 13-20 & 46-73** are rejected under 35 U.S.C. 102(a) as being anticipated by Pan et al. (2002).

Pan teaches coiled carbon nanotubes with substantially uniform diameter and distance between coils throughout its length, diameters of less than 100nm, and distance between coils of less than 200nm (Fig. 2). See above with regard to product-by-process claims 46-73.

10. **Claims 1-12** are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Pan et al. (2002).

Pan teaches coiled carbon nanotubes with substantially uniform diameter and distance between coils throughout its length, but does not teach the non-hexagonal to hexagonal ratio of the coils. From the variety of coils produced as shown in Fig. 2, it is expected that many of the possible ratios of nanocoils are produced by Pan, including those of the presently claimed invention, since the ratio determines the tightness of the coils.

11. **Claims 13-20 & 46-73** are rejected under 35 U.S.C. 102(e) as being anticipated by Nakayama et al. (6,558,645).

Nakayama teaches coiled carbon nanotubes with substantially uniform diameter and distance between coils throughout its length, diameters of less than 100nm, and distance between coils of less than 200nm (Fig. 3 & 6). See above with regard to product-by-process claims 46-73.

12. **Claims 1-12** are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nakayama et al. (6,558,645).

Nakayama teaches coiled carbon nanotubes with substantially uniform diameter and distance between coils throughout its length, but does not teach the non-hexagonal

to hexagonal ratio of the coils. From the variety of coils produced as shown in Fig. 3 & 6, it is expected that many of the possible ratios of nanocoils are produced by Nakayama, including those of the presently claimed invention, since the ratio determines the tightness of the coils.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alvin T. Raetzsch whose telephone number is 571-272-8164. The examiner can normally be reached on 9-5 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ATR

STUART L. HENDRICKSON
PRIMARY EXAMINER